yet ossified, and becomes compressed, like a valve during inspiration, on account of the paralysis of the dilating muscles.

In other cases death occurred quite rapidly, without any preceding symptoms, and Zander attributes it, hence, to sudden paralysis of the heart; but this explanation is not satisfactory.

In adult animals it is even more difficult to find the real cause of death. In some instances Zander found a fatty degeneration of the heart. In other cases the post-mortem appearances are detailed, without any mention whatever of this condition. It seems that Zander did not use the microscope to any great extent. He admits, however, that this degeneration may cause death by cardiac paralysis. Nevertheless, the heart thus degenerated was found beating in some birds after failure of the respiration! The existence of trophic nerves, however, the author denies altogether, attributing this fatty degeneration to the state of inanition caused by vagus-section. At any rate, he claims to have found the same morbid process in the hearts of starving pigeons. The most important cause of death Zander seeks in the starvation due to paralysis of the gizzard and œsophagus. Although the animals can eat, food is of no use to them, since it is all retained in the gizzard, and putrifies in its cavity. It cannot even be pushed by force into the muscular stomach. The animals dying about the end of the first week presented the usual post-mortem appearances of death from starvation. Some attempts made by the author to maintain life by artificial feeding did not succeed.

Notwithstanding the care betrayed in the paper, as well as the many new facts found in it, the cause of death after vagus-section is not quite clear. As it appears from the accounts of his experiments, the animals died often before they had lost forty per cent. of their weight, a loss found regularly by Chossat. They died, besides, within a period of time rather too short to permit death by starvation. H. G.

## IV.—RICHET: CEREBRAL CONVOLUTIONS.

STRUCTURE DES CIRCONVOLUTIONS CEREBRALES (ANATOMIE ET PHYSIOLOGIE). THESE PRESENTEE ET SOUTENUE A LA FACULTE DE MEDICINE DE PARIS POUR LE CONCOURS DE L'AGREGATION (SECTION D' ANATOMIE ET DE PHYSIOLOGIE). Par le Dr. Charles Richet. (*Structure of the Cerebral Convolutions.*) Paris, 1878. 172 pages. 2 litho. plates.

The first part of this memoir is devoted to a description, very fairly minute and accurate, of the general structural anatomy of the cerebral cortex, the descriptive anatomy of the convolutions being left to the later portion of the work. While it contains nothing particularly original, it is yet a very good *resumé* of the latest discovered facts by European investigators, and, as such, deserves a detailed notice.

After a short historical introduction, in which he sums up by giving to Malpighi the credit of first noticing the cortical cells and fibres, to Vicq d'Azyr and Baillarger that of noting the macroscopic appearances, and to Meynert, Betz and Luys the description of the microscopic structure, and a few remarks on the general plan of fissures and convolutions, the author passes to the consideration of the elemental structures of this part of the nervous centres, the various kinds of cells, pyramidal, giant, fusiform, the myelocytes, the neuroglia, the fibres and vessels, are noticed—some of them fully described and figured; and then he enters into a complete description of the five or six layers which form the cortex, following principally Meynert and Bevan Lewis in the views he adopts. Next, giving attention to the structure of particular convolutions, he notices the motor regions, characterized by the presence of giant cells (Betz, Major), and alludes to the more recent discovery of Pierret, that the dimensions of these cells are not merely in relation to their motor function, but also to the extent of the centrifugal track of the nerves of which they seem to be the origin.

The occipital or sensitive convolutions and their distinguishing differences from the motor ones are described, and an interesting parallel is drawn between their structure and that of the retina; and the author adopts Meynert's opinion that the retina, in its structure, its development, and its functions, is to be regarded as an expansion of the sensory portion of the cerebral cortex.

The special types of convolutions are next described. The first, the author here following Meynert, is that of the Sylvian fissure convolutions, characterized by a special development of the lowest or claustral layer containing the greatest number of the elongated fusiform cells. As to the special relations of the claustrum which underlies these convolutions, which Meynert considers to appertain to the cortical system, while others, such as Luys, hold that its relations are with the corpus striatum, our author expresses no positive opinion. The other special types of cerebral convolutions mentioned are the hippocampus and the olfactory bulb, the morphology of which, as well as the microscopic structure, are described in detail.

The remainder of this part of the memoir includes remarks on the minute comparative anatomy of the convolutions, on the white substance, on their circulation, and on their development. These are simply judicious *resumés* of the statements and opinions that have been advanced by various authors. M. Richet does not usually, as we have seen, commit himself on disputed points, but is suggestive and very fair in his statements. Some of the most recent papers, such as that of Pansch, on the development of the convolutions, are not noticed, though the author is generally very well up to date in his citations.

The second part of M. Richet's memoir commences with an anatomical introduction, giving the general topography of the surface of the hemispheres, and a historical introduction reviewing the physiological ideas that have been held in regard to the cerebral convolutions from the earliest period down to the present. In regard to the credit of the discoveries in cerebral physiology, it is well known there has been some controversy, but the summing up of our author seems to be eminently judicial and fair.

Passing next to the study of the physiology of the cortex, M. Richet divides it into two terms, its properties and its functions. Following out this division, he first considers the excitability of the convolutions. He reviews the controversy as to the diffusion of electric currents raised by Dupuy and others, and the relative excitability of the grey matter of the convolutions and the subjacent white fibres, and discusses the experiments of Carville and Duret, Putnam, Braun, Franck and Pitres on this point, and narrates some of his own. The conclusions he arrives at are stated as follows:

1. "That peripheral diffusion may be avoided, but that diffusion downwards through the grey matter to the white, is unavoidable;

2. "That the white substance of the brain is certainly excitable, as was thought to be the case by Haller, and denied by Flourens ;

3. "That probably the cortical grey matter is also excitable by electricity, although direct proof of this is almost impossible ;

4. "That we may admit, perhaps still hypothetically, the following order as regards excitability (electrical) of the nervous organs (*a*) nerve terminations; (*b*) nerve trunks; (*c*) grey matter of the centres ; (*d*) white substance of the centres."

Passing by what is said as to the effects of drugs on the excitability, on the thermic, electric and chemical conditions, in regard to which, M. Richet agrees with Hermann rather than Du Bois Reymond, and on the cortical circulation, all of which is a well stated and judicious summary of our knowledge of the subjects, we come to the second chapter, on the functions of the convolutions. We cannot abstract this, it is a critical summary of all or very nearly all of the investigations that have been made on the subject, arranged under the three heads of the motor, the sensory and the intellectual functions. The first of these is again subdivided as follows : First, (A) is given a brief account of the methods of investigation ; then (B) the action of the convolutions on the muscles of animal life ; (C) their action on the muscles of organic life ; (D) on aphasia, and (E) the theories of the motor innervation of the convolutions. Only the last of these needs remark, and we can best give the author's ideas in his own language, in his summary of facts.

(A) "Cortical paralyses are transitory in the dog; they are permanent in the ape (Ferrier), and in man Charcot has shown, with an imposing mass of evidence, that they exist permanently after lesion of one hemisphere, without lesion of the ganglionary centres.

(B) "Cortical (Rolandic) lesions never induce anæsthesia (immediate or consecutive) in man, while in the dog, sensibility is certainly affected.

(C) "There therefore exists a notable difference between the brain of man and that of the dog, hence conclusions drawn from the case of the one should not be applied to the other except with considerable reservations.

(D) "In man there are very rare and exceptional cases, if we eliminate the doubtful ones, but certainly some authentic cases, in which deep and extensive lesions of one or other of the Rolandic convolutions have not produced paralysis, as well as of lesions of Broca's convolution that have not caused aphasia.

(E) "Nevertheless, in a great majority of cases, a cortical lesion of the hemisphere causes sclerosis of the lateral columns, the medulla oblongata, etc., without passing through the basal ganglia. If, as is probable, the trophic action (?) and the excito-motor action follow the same route, we may conclude that there are white bundles passing directly from the Rolandic region to the cord and muscles without passing by way of the ganglionary centres.

(F) "On the other hand, it is certain that, in the dog, every excitation of the Rolandic zone not only acts (directly?) on the muscles, but also on the sensibility, the arterial pressure, the salivary secretion, the vaso-motors, etc.

(G) "In the new-born the cerebral cortex is not excitable, nevertheless they are capable of movements and of (unconscious) sensibility. After the ablation of the sigmoid gyrus in new-born pups there remains no paralysis.

(H) "Are there pyscho-motor centres? This is very dubious, but it is of little importance, and it is already a beautiful result of united physiology and pathology to have demonstrated psychomotor bundles of fibres, more developed in man than in the dog.

1. "Therefore, in the majority of individuals, but not in all, there exist well limited pyscho-motor bundles, that may be separately paralyzed, atrophied, or excited.

2. "This isolation is very imperfect in the dog; not only between the various motor bundles, but also between the cortical motor zone and the other cerebral regions.

3. "The pyscho-motor apparatus, comprising the whole cortex and the conducting fibres, is much less developed in animals than in man.

4. "It is a highly developed apparatus (*appareil de perfectionnement*) that matures slowly, and only in the higher animals."

These conclusions the author states are only provisional, and they are certainly sufficiently cautious and conservative in most respects. Nevertheless, in one point it seems to us that a statement needs modification. Tarchanoff, whose researches are alluded to in a foot-note, but not mentioned at length, has shown that there exists quite a difference in different species of animals as to the excitability of the cortical motor regions at birth, hence the general statement that the cortex is unexcitable in new-born animals is hardly correct.

The section on the sensory functions of the cerebral hemispheres is mainly only a statement of Ferrier's investigations in this direction, with some references to those of Munk, Charcot, and others. There is also nothing specially original or striking in that on the intellectual functions of the convolutions, the subject is treated very briefly, the author does not enter at any length into the speculations that are suggested by it.

In closing we will say of the work as a whole, that it is a very good critical summary of the anatomy and physiology of the cortex of the hemispheres, as far as at present known, or at least, as far as known up to a very recent period. The careful and conservative spirit of the work is everywhere conspicuous, and we are not sure that the author does not sometimes carry his conservatism a little too far in certain directions; this however, is an error on the safe side. To those who read French, and every educated physician should be able to do this, it will be found a convenient and useful work of reference.

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## V.—BUCKE: THE MORAL NATURE.

MAN'S MORAL NATURE. AN ESSAY. By Richard Maurice Bucke, M. D., Medical Superintendent of the Asylum for the Insane, London, Ontario. New York: G. P. Putnam's Sons. 1879. 200 pages.

This is, in many respects, a rather curious work. Its claim for notice in a medical journal not specially given to the discussion of ethical theories is in its treatment of its subject. There is, we believe, a physiology of ethics: the moral nature of man has its connections with his physical organization, and so far as the work before us is an attempt to work out and describe those connections, and to propose and support a physiological theory of morals, it falls within the special province of this journal.

It appears to be an expansion of two papers by the same author, read before the American Association of Superintendents at their meetings in 1877 and 1878, and published in the October numbers of the *American Journal of Insanity* for the same years. These articles attracted our attention at the time, but